

**Remarks**

In view of the above amendments and the following remarks, reconsideration of the outstanding office action is respectfully requested.

Claims 55-57 have been canceled without prejudice in response to the restriction requirement. The U.S. Patent and Trademark Office (“PTO”) has based its refusal to withdraw the restriction requirement as between the nucleic acid molecules encoding hypersensitive response elicitors from different bacterial sources at least in part on the absence of an explicit admission that prior art regarding use of one of the identified nucleic acid molecules would have rendered the others obvious. In response thereto, applicants hereby admit that prior art use of a nucleic acid encoding one hypersensitive response elicitor from a bacterial pathogen in preparing a transgenic plant, where the nucleic acid imparts systemic disease resistance to the plant, would have rendered obvious the use of other nucleic acids encoding other hypersensitive response elicitors from bacterial pathogens (that were known at the time of filing the parent application). Therefore, applicants respectfully request that the decision to withdraw claims 45-47 and 65-67 should be reversed and that the claims should be examined fully.

Applicants have introduced new claims 78 and 79, both of which recite the use of a promoter that is not pathogen-inducible. Support for the new claims appears in the description of the invention at page 36, lines 17-21, which recites: “As is conventional in the art, such transgenic plants would contain suitable vectors with various promoters including pathogen-induced promoters, and other components needed for transformation, transcription, and, possibly, translation.” Thus, the present application contemplates the use of various promoters, one type of which includes pathogen-inducible promoters. The invention therefore also contemplates the use of non-inducible promoters. At the time of filing the present application, one of ordinary skill in the art was well aware of various non-inducible promoters (i.e., constitutive promoters) and, therefore, would have understood the above-recited language to support the use of such non-inducible promoters. Therefore, no new matter has been entered.

The objection to claims 41-44, 49-53, 62-64, 69-73 and 75 is respectfully traversed in view of the above amendments.

The rejection of claims 41-44, 49-53, 58-64, 69-73 and 75-77 under 35 U.S.C. 112, first paragraph, as lacking written descriptive support for the claimed genus is respectfully traversed.

The PTO has taken the position at page 5 of the outstanding office action that applicants have identified only two nucleic acids (encoding hypersensitive response elicitors) that can be used to practice the claimed invention. Applicants respectfully disagree.

Beginning on page 16 and continuing through page 27 of the present application, four exemplary nucleic acids (encoding hypersensitive response elicitors of bacterial plant pathogen) are, in fact, disclosed. SEQ ID NO: 2 is a DNA molecule encoding HrpN of *Erwinia chrysanthemi*, SEQ ID NO: 4 is a DNA molecule encoding HrpN of *Erwinia amylovora*, SEQ ID NO: 6 is a DNA molecule encoding HrpZ of *Pseudomonas syringae*, and , SEQ ID NO: 8 is a DNA molecule encoding PopA1 of *Pseudomonas solanacearum*. Thus, the issue is whether the four exemplary species are representative of the claimed genus. Applicant submits that they are.

As demonstrated by the previously submitted Declaration of Zhong-Min Wei Under 37 C.F.R. § 1.132 (“Wei Declaration”), one of ordinary skill in the art would have understood that applicants were in possession of the presently claimed invention at the time the present application was filed. This is so, because the four exemplary species were recognized at the time of filing as belonging to an art-recognized class of hypersensitive response eliciting proteins produced by bacterial plant pathogens. See Wei Declaration ¶¶ 12-16. In addition to their shared properties which distinguish the art-recognized class of elicitors, the elicitors of this class share the ability to induce specific plant responses. The induction of plant disease resistance, plant growth enhancement, and plant stress resistance are three plant responses that result from treatment of plants or plant seeds with a hypersensitive response elicitor from a plant pathogen. See Wei Declaration ¶¶ 17-32.

The PTO has failed to identify any evidence suggesting that one of ordinary skill in the art would *not* have recognized the four exemplary proteins (and their encoding nucleic acids) as being representative of the claimed genus. Instead, the PTO merely cites to University of California v. Eli Lilly, 119 F.3d 1559 (Fed. Cir. 1997) (addressing written description requirement) and Amgen Inc. v. Chugai Pharm. Co. Ltd., 18 USPQ2d 1016 (Fed. Cir. 1991) (addressing enablement) for the proposition that functional language alone is insufficient to support a claimed genus. These cases are factually distinguishable from the presently claimed subject matter and, therefore, fail to support the PTO’s position in this

case. In Eli Lilly, the Federal Circuit admonished the use of functional language for describing a product (a cDNA or construct or host cell containing the cDNA). Specifically, the Federal Circuit held that a specification that disclosed only a single species of cDNA encoding rat proinsulin ("PI") and preproinsulin ("PPI") was lacking written descriptive support for claims reciting cDNA for human PI and PPI, mammalian PI and PPI, and vertebrate PI and PPI. 119 F.3d 1567-69. In Amgen, the Federal Circuit found claims covering all recombinant erythropoietin non-enabled by a disclosure that described only human and a few mutant analogs thereof. 18 USPQ2d at 1213-14. Thus, in each of these cases, the functional language was unaccompanied by a written description that identified diverse species within the claimed genus.

In contrast, the presently claimed invention encompasses the use of nucleic acids encoding any bacterial hypersensitive response elicitor protein or polypeptide which, when expressed in a plant, imparts systemic pathogen resistance to the plant. As noted in the Wei Declaration, the bacterial hypersensitive response elicitor proteins were known at the time of filing to belong to an art-recognized class. Moreover, as noted above, the present application identifies four distinct species of the genus currently under examination (i.e., given applicants' admission above). For these reasons, the decisions in Eli Lilly and Amgen are not instructive in this case.

Applicants have provided evidence (via the Wei Declaration) as to why the four disclosed species adequately represent the claimed genus and why one of ordinary skill in the art would have recognized that applicants were in possession of the claimed invention. The PTO, on the other hand, has provided none.<sup>1</sup>

For all these reasons, the rejection of claims 41-44, 49-53, 58-64, 69-73 and 75-77 as lacking written descriptive support is improper and should be withdrawn.

The rejection of claims 41-44, 49-53, 58-64, 69-73 and 75-77 under 35 U.S.C. 112, second paragraph, for indefiniteness is respectfully traversed in view of the above amendments.

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<sup>1</sup> On an aside, the PTO cites as "evidence" the absence of nucleic acids encoding DspE, DspF, and HrpW nucleic acids which are disclosed in applications also assigned to the assignee of record. Applicants note that the priority filing date of the present application is December 3, 1997, and the present application claims the benefit of a provisional application filed December 5, 1996. The other applications identified by the PTO were not even filed until well after December 1997. Thus, the present application could not have disclosed such subject matter.

The rejection of claims 41-43, 49-53, 58-63, 69-73 and 75-77 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 5,850,015 to Bauer et al. (“Bauer”) is respectfully traversed.

Bauer teaches the hypersensitive response elicitor *HrpN<sub>Ech</sub>* of *Erwinia chrysanthemi* and its encoding nucleic acid. Bauer also teaches the preparation of transgenic plants that are pathogen resistant by using a DNA construct that includes the *hrpN<sub>Ech</sub>* nucleic acid and a pathogen-inducible promoter. Bauer makes no mention that the inducible resistance is systemically acquired.

Claim 41 presently recites a method of imparting pathogen resistance to plants that includes the steps of “providing a transgenic plant seed transformed with a DNA molecule encoding a hypersensitive response elicitor polypeptide or protein...planting the transgenic plant seed in soil...and propagating a plant from the planted seed, whereby expression of the hypersensitive response elicitor polypeptide or protein by the plant imparts systemic pathogen resistance to the plant.” Claims 58 recites a plant produced according to the process of claim 41, and claims 59-60 recite a transgenic plant seed and a plant propagule, respectively, from a plant produced according to the process of claim 41.

Claim 61 presently recites a method of imparting pathogen resistance to plants that includes the step of “transforming a plant with a DNA molecule encoding a hypersensitive response elicitor polypeptide or protein, whereby said transforming provides for expression of the hypersensitive response elicitor polypeptide or protein that imparts systemic pathogen resistance to the transgenic plant.” Claim 75 recites a transgenic plant produced by such the process of “transforming a plant with a DNA molecule encoding a hypersensitive response elicitor polypeptide or protein, whereby said transforming provides for expression of the hypersensitive response elicitor polypeptide or protein to impart system pathogen resistance to the transgenic plant”, and claims 76 and 77 recite a transgenic plant seed and plant propagule, respectively, from a plant according to claim 75.

To anticipate a claimed invention, a single reference must teach each and every limitation of the claimed invention. Hybritech v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1379, 231 USPQ 81, 90 (Fed. Cir. 1986). As noted above, Bauer fails to teach or suggest each and every limitation of the presently claimed invention. In particular, with respect to claim 41 (and claims dependent thereon) Bauer fails to teach or suggest the propagating of a plant from a transgenic plant seed, where the propagated plant is characterized by systemic pathogen resistance as a result of the plant expressing the

hypersensitive response elicitor polypeptide or protein. With respect to claim 61 (and claims dependent thereon), Bauer fails to teach or suggest transforming a plant as recited, where the expression of the hypersensitive response elicitor imparts systemic pathogen resistance to the plant.

For these reasons, the rejection of claims 41-43, 49-53, 58-63, 69-73, and 75-77 as anticipated by Bauer is improper and should be withdrawn.

The rejection of claims 41-42, 44, 52, 58-62, 64, 72, and 75-77 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,174,717 to Beer et al. ("Beer") is respectfully traversed.

Beer teaches the hypersensitive response elicitor  $HrpN_{Ea}$  of *Erwinia amylovora* and its encoding nucleic acid. Beer also teaches preparation of DNA constructs including the *hrpN<sub>Ea</sub>* gene and various inducible promoters, which can be used to prepare transgenic plants. In particular, Beer suggests using pathogen-inducible promoters to prepare pathogen-resistant plants. Beer makes no mention that the inducible resistance is systemically acquired.

As noted above, Beer fails to teach or suggest each and every limitation of the presently claimed invention. In particular, with respect to claim 41 (and claims dependent thereon) Beer fails to teach or suggest the propagating of a plant from a transgenic plant seed, where the propagated plant is characterized by systemic pathogen resistance as a result of the plant expressing the hypersensitive response elicitor polypeptide or protein. With respect to claim 61 (and claims dependent thereon), Beer fails to teach or suggest transforming a plant as recited, where the expression of the hypersensitive response elicitor imparts systemic pathogen resistance to the plant.

For these reasons, the rejection of claims 41-42, 44, 52, 58-62, 64, 72, and 75-77 as anticipated by Beer is improper and should be withdrawn.

The rejection of claims 41-44, 49-53, 58-64, 69-73, and 75-77 under 35 U.S.C. 103(a) for obviousness over Bauer in view of Wei et al., "Harpin, Elicitor of the Hypersensitive Response Produced by the Plant Pathogen *Erwinia amylovora*," Science 257:85-88 (1992) ("Wei") is respectfully traversed.

The teachings of Bauer are set forth above.

Wei teaches the isolation of HrpN<sub>Ea</sub> and its encoding nucleic acid, but Wei does not teach or suggest the production of transgenic plants or plant seeds that contain the nucleic acid encoding HrpN<sub>Ea</sub>.

A proper *prima facie* showing of obviousness requires the PTO to satisfy three requirements. First, the prior art relied upon, coupled with knowledge generally available to one of ordinary skill in the art, must contain some suggestion which would have motivated the skilled artisan to combine references. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the PTO must show that, at the time the invention was made, the proposed modification had a reasonable expectation of success. See Amgen v. Chugai Pharm. Co., 927 F.2d 1200, 1209, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Finally, the combination of references must teach or suggest each and every limitation of the claimed invention. See In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

In this case, the PTO has failed to demonstrate that the combination of Bauer and Wei would have taught or suggested each and every limitation of the claimed invention. The PTO has cited to Wei merely for the teaching of the nucleic acid encoding HrpN<sub>Ea</sub>. Even if one of ordinary skill in the art were to have substituted the nucleic acid of Wei for use with the teachings of Bauer, the combination Wei and Bauer would have failed to overcome the above-noted deficiencies of Bauer. Because Wei cannot overcome the deficiencies of Bauer, the rejection of claims 41-44, 49-53, 58-64, 69-73, and 75-77 for obviousness over Bauer in view of Wei is improper and should be withdrawn.

Applicant further notes that neither Bauer, Wei, nor the combination thereof teaches or suggests the use of a non-inducible promoter. In fact, as noted above, Bauer explicitly teaches away from non-inducible promoters. Therefore, the combination of Bauer and Wei fails to teach or suggest this limitation of new claims 78 and 79, let alone that one of ordinary skill in the art would have had any expectation of success when using a non-inducible promoter. For these reasons, new claims 78 and 79 are likewise allowable over the combination of Bauer and Wei.

The rejection of claims 41-42, 44, 52, 58-62, 64, 72 and 75-77 under the judicially-created doctrine of obviousness-type double patenting over claim 16 of Bauer is respectfully traversed.

The teachings of Bauer are set forth above.

Claim 16 of Bauer depends from claim 15, which depends from claim 13, which depends from independent claim 1. Claims 1, 13, 15, and 16 are set forth below:

1. An isolated DNA molecule encoding a protein or polypeptide corresponding to a protein or polypeptide in *Erwinia chrysanthemi* which elicits a hypersensitive response in plants, wherein said isolated DNA molecule has the nucleotide sequence of SEQ. ID. No. 6.

\* \* \*

13. A method of imparting pathogen resistance to plants comprising:  
transforming a plant with the DNA molecule of claim 1 with a pathogen inducible promoter in a plant transformation vector.

\* \* \*

15. A method according to claim 13, wherein the plant is selected from the group consisting of dicots and monocots.

\* \* \*

16. A method according to claim 15, wherein the plant is selected from the group consisting of rice, wheat, barley, rye, corn, potato, sweet potato, bean, pea, chicory, lettuce, endive, cabbage, cauliflower, broccoli, turnip, radish, spinach, asparagus, onion, garlic, eggplant, pepper, celery, carrot, squash, pumpkin, zucchini, cucumber, apple, pear, quince, melon, plum, cherry, peach, nectarine, apricot, strawberry, grape, raspberry, blackberry, pineapple, avocado, papaya, mango, banana, soybean, tobacco, tomato, sorghum, and sugarcane.

None of the remaining claims of Bauer specify that the method is carried out by providing of a transgenic plant seed transformed as recited, let alone planting of the transgenic plant seed, and propagating of a plant therefrom, where the propagated plant is characterized by *systemic* pathogen resistance as a result of the plant expressing the hypersensitive response elicitor polypeptide or protein. Likewise, none of the remaining claims recite transforming a plant as recited in claims 61 and 75, where the expression of the hypersensitive response elicitor imparts *systemic* pathogen resistance to the plant.

The invention of claim 16 in Bauer is limited to the use of a pathogen inducible promoter in a plant transformation vector (recited in claim 13 of Bauer), whereas the claimed invention involves *systemic* pathogen resistance, not simply inducible pathogen resistance. Nowhere does Bauer teach or suggest, let alone claim, the use of transgenic constructs for the preparation of plants that are systemically pathogen resistant (and plants so made). Because the invention claimed in Bauer fails to teach or suggest the above-identified

steps of claims 41, 61, and 75, the obviousness-type double patenting rejection of claims 41-42,44,52,58-62,64,72 and 75-77 is improper and should be withdrawn.

In view of the all of the foregoing, applicants submit that this case is in condition for allowance and such allowance is earnestly solicited.

Respectfully submitted,

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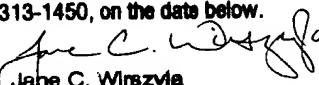
  
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